REMARKS

Claims 1-3, 5-13, 15-23, and 25-28 are pending in this Application.

Claims 1, 12, 13, and 21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,803,967 (hereinafter Plano) in view of JP 03-075298 (hereinafter Takahiro). The Office Action asserts that Plano teaches a method of growing and a diamond structure. The Office Action asserts that a layer of diamond nucleation sites are prepared on a substrate where the sites are orientated the same for the vapor growth. The Examiner admits that Plano does not teach the substrate that is claimed.

Turning to the prior art, Plano deposits polycrystalline diamond layers on the substrate, which can be observed when the layer is viewed macroscopically. However, the deposited diamond layer of Plano is divided into domains, each of which has {100} and {111} facets. Figs. 2A-2D show a first diamond layer 40 having an orientation of {100} and {111}, which results in a highly oriented first diamond layer(s) 45 (col. 6, lines 1-19). Plano in col. 6, lines 19-21 states:

> Using these parameters, a highly oriented first diamond layer(s) 45 can be formed comprising **a plurality of side-by-side columnar monocrystalline diamond grains** 55 which extend outwardly from the substrate 10 (*emphasis added*).

It is well known by persons skilled in the art that polycrystalline diamond consists of *randomly oriented* diamond crystals. The "Example" of Plano supports the above fact and discloses that the operation temperature for the microwave tube during the diamond layer formation is 830°C (Table I) and 800°C (Table II). This is considerably different from the monocrystalline diamond that is deposited at a relatively low temperature of 870°C, and the polycrystalline diamond that is deposited at a higher temperature of 980°C (*see, e.g.,* Example I of the originally filed specification). Thus, the diamond layer of Plano has *monocrystalline characteristics*, and is not polycrystalline.

According to the claimed subject matter per claims 1 and 12, only diamond monocrystalline plates are used as a substrate, and the diamond polycrystalline film is formed on the diamond monocrystalline substrate by vapor phase synthesis. On the other hand, Plano discusses preparing "polycrystalline" diamond nucleation sites on the substrate. Moreover, as discussed above, the diamond of Plano is <u>not</u> polycrystalline, and does not have the same function as the claimed diamond polycrystalline film. Plano fails to disclose or suggest, at a minimum, "a diamond polycrystalline film," as required by claims 1 and 12.

The Examiner admits that Plano does not teach the substrate that is claimed. The Office Action relies on Takahiro in an attempt to cure the deficiencies of Plano. The Office Action states that Takahiro teaches that large single crystal diamonds can be placed together to create a base for diamond growth. The Office Action asserts that it would have been obvious to one of ordinary skill in the art to modify Plano by the teachings of Takahiro to use a single crystal diamond base in order to ensure that the grown vapor layer of diamond has uniform orientation.

However, Takahiro is directed to growing **a monocrystalline diamond** on a substrate having a plurality of monocrystal diamonds, <u>not</u> to growing **a polycrystalline diamond** on a diamond monocrystalline substrate. According to the claimed subject matter per claims 1 and 12, the claimed diamond composite substrate is a diamond polycrystalline film formed over a diamond monocrystalline substrate by vapor phase synthesis. Thereby as taught in the instant specification, the resultant diamond composite substrate exhibits an increase in bending resistance (*see, e.g.,* Tables 2 and 4; Paras. [0056]-[0063] of the originally filed specification). However, Takahiro does not disclose or suggest this, and apparently is unaware of the unexpected improvement in **<u>both</u>** high toughness and high thermal conductivity. Takahiro fails to disclose or suggest, "...a diamond monocrystalline substrate_having first and second opposed main faces; and

a diamond polycrystalline film laminated thereon by a vapor phase synthesis," as recited in claim 1. Takahiro also fails to disclose or suggest, "...the plurality of diamond monocrystals are joined by **a diamond polycrystalline film** formed by a vapor phase synthesis," as recited in claim 12.

Regarding independent claim 21, as discussed above, Plano does not disclose a substrate equivalent to the claimed substrate having a plurality of diamond monocrystals. Naturally, the method discussed is Plano in *different* from the claimed method of manufacturing a diamond composite substrate having a plurality of diamond monocrystals and a diamond polycrystalline film.

Takahiro describes only growing a diamond monocrystal. Takahiro is *silent* regarding a diamond polycrystalline film.

Consequently, the method discussed is Takahiro is *different* than the claimed method of manufacturing a diamond composite substrate having a plurality of diamond monocrystals and a diamond polycrystalline film. It is well known by persons skilled in the art that a large scale monocrystalline diamond prepared by Takahiro's approach tends to be brittle due to stress accumulations around the small angle boundaries.

Further, Takahiro heats the substrate to 870°C at a temperature where the diamond monocrystals grow.

On the other hand, the substrate temperatures of Examples 1 and 2 for forming a diamond polycrystalline film by vapor phase synthesis in the present application are 980°C and 900°C, respectively, which determines the crystallographic structure.

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do

so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). There is no suggestion in Takahiro to modify the diamond nucleation sites of Plano so that the monocrystalline film is a polycrystalline film, nor does common sense dictate the Examiner-asserted modification. The Examiner has not provided any evidence that there would be any obvious benefit in making the asserted modification of Plano. *See KSR Int'l Co. v. Teleflex, Inc.*, 500 U.S. ____ (No. 04-1350, April 30, 2007) at 20.

The only teaching of the diamond composite substrate, and method for manufacturing a diamond composite substrate is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must not be based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claims 2, 3, 5-11, 15-20, 22, 23, and 25-28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Plano in view of Takahiro. Dependent claims 2, 3, 5-11, 15-20, 22, 23, and 25-28 are allowable for at least the same reasons as the independent claims for which they depend.

Conclusion

In view of the above remarks, Applicants submit that this application should be allowed and the case passed to issue. If there are any questions regarding this Response or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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